R&S®FS-K96/-K96PC OFDM Vector Signal Analysis Software

Release Notes Software Version 3.5

These Release Notes describe the following options of the R&S®OFDM Vector Signal Analysis Software:

- **R&S®OFDM Vector Signal Analysis Software FS-K96, order no. 1310.0202.06**
- **R&S®OFDM Vector Signal Analysis Software FS-K96PC, order no. 1310.0219.06**
- **R&S®OFDM Vector Signal Analysis Software FS-K96U, order no. 1310.0225.06**

New Features in V3.5:

- **Support for the 160 MHz Analysis Bandwidth option FSV-B160**
- **Support for the 320 MHz Analysis Bandwidth option FSW-B320**

© 2013 Rohde & Schwarz GmbH & Co. KG
Muehldorfstr. 15, 81671 Munich, Germany
Phone: +49 89 41 29 - 0
Fax: +49 89 41 29 12 - 164
E-mail: mailto:info@rohde-schwarz.com
Internet: http://www.rohde-schwarz.com

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Trade names are trademarks of the owners.

The following abbreviations are used throughout this document:
R&S®FS-K96/-K96PC is abbreviated as R&S FS-K96/-K96PC.

Test & Measurement
Release Notes
PAD-T-M: 3574.3288.02/02.00/CI/1/EN

ROHDE&SCHWARZ

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1 Installation

1.1 Version Minimum System Requirements

The following minimum system configuration is recommended for the use of the R&S FS-K96 / R&S FS-K96PC Software:

- Operating System: Microsoft Windows XP Professional (+ SP2)
- Free Hard Disk Space: 1 GB
- Free RAM: ≥1 GB
- Graphics Resolution: ≥XGA (800x600 pixel)
- USB: one free USB port to connect the smartcard reader (if no PC-built-in smartcard reader is used)
- Measuring instrument connection:
  - Hardware: IEC/IEEE bus or LAN connection
  - Software: VISA driver, National Instruments VISA version ≥4.2

Windows 7 32-bit and 64-bit systems are supported.

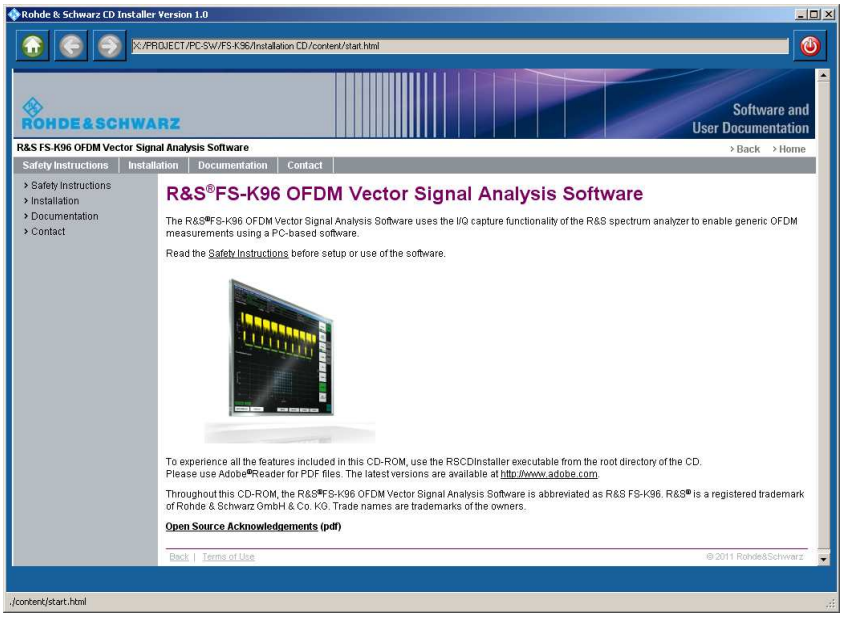
1.2 Software Installation

For successful installation of the R&S FS-K96 Software you need to

1. prepare your PC
2. install the R&S FS-K96 Software

In order to complete both steps, execute the `AutoStart.exe` file in the main directory of the installation CD. In the case that you have download the installation package from the Rohde&Schwarz homepage, please unzip the directory and go to the main directory.

The following screen will appear and the browser will guide you through the installation process.


Rohde & Schwarz CD Installer Version 1.0
X:/PROJECT/PC-SW/FS-K96/Installation CD/content/start.html
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R&S®FS-K96 OFDM Vector Signal Analysis Software
The R&S®FS-K96 OFDM Vector Signal Analysis Software uses the I/Q capture functionality of the R&S spectrum analyzer to enable generic OFDM measurements using a PC-based software.
Read the Safety Instructions before setup or use of the software.
To experience all the features included in this CD-ROM, use the RSCDInstaller executable from the root directory of the CD.
Please use Adobe®Reader for PDF files. The latest versions are available at http://www.adobe.com.
Throughout this CD-ROM, the R&S®FS-K96 OFDM Vector Signal Analysis Software is abbreviated as R&S FS-K96. R&S® is a registered trademark of Rohde & Schwarz GmbH & Co. KG. Trade names are trademarks of the owners.
Open Source Acknowledgements (pdf)
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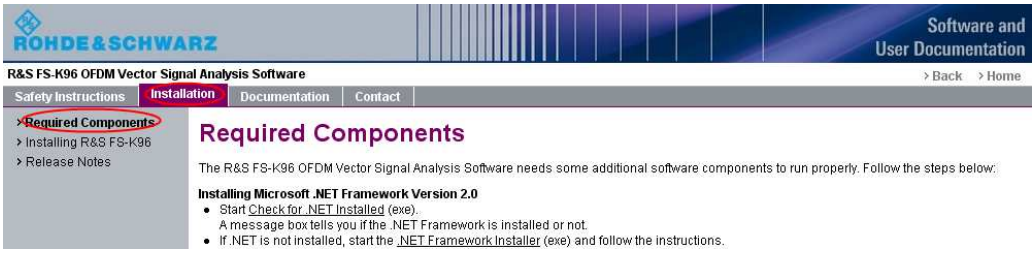
./content/start.html

1.2.1 Preparing the PC

The R&S FS-K96 Software needs some additional software components to run properly. All necessary components are delivered with the software itself. You can install them from the CD-ROM (or your downloaded install directory) prior to installing the R&S FS-K96 Software.

They are located in the category “Installation” and then “Required Components”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Required Components
The R&S FS-K96 OFDM Vector Signal Analysis Software needs some additional software components to run properly. Follow the steps below:
Installing Microsoft .NET Framework Version 2.0
Start Check for .NET Installed (exe).
A message box tells you if the .NET Framework is installed or not.
If .NET is not installed, start the .NET Framework Installer (exe) and follow the instructions.

Prepare the PC as follows (a detailed explanation follows after the list):

3. Check if Microsoft .NET Framework 2.0 is installed on your computer by clicking on the link “Check for .NET installed”. Start the installation if it is not already installed.
4. Install all required components using the R&S Framework Installer.
5. Install VISA for remote operation of the used instruments.

Installing Microsoft .NET Framework Version 2.0

You need to install Microsoft .NET Framework 2.0 or a later version in order to use the R&S FS-K96 Software. Therefore, you need to check whether the .NET Framework is already installed.

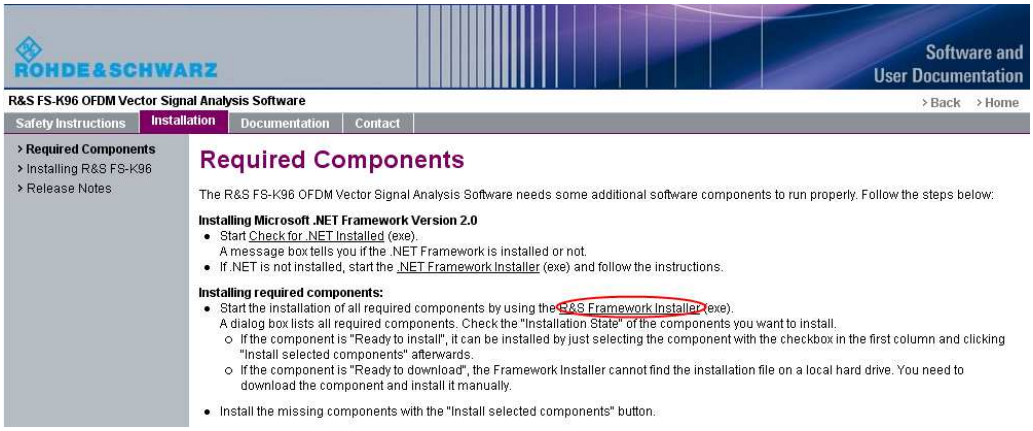
6. Click on “Check for .NET Installed.exe”.

7. A message box tells you, if the .NET Framework is installed or not.
8. If the .NET Framework is not installed on your PC, click on the link to the installer.

Install the required components

A number of software components are required to use the R&S FS-K96 Software. It is recommended to use the R&S Framework Installer available on the CD-ROM to install all required components.

9. Start the R&S Framework Installer by clicking on the link.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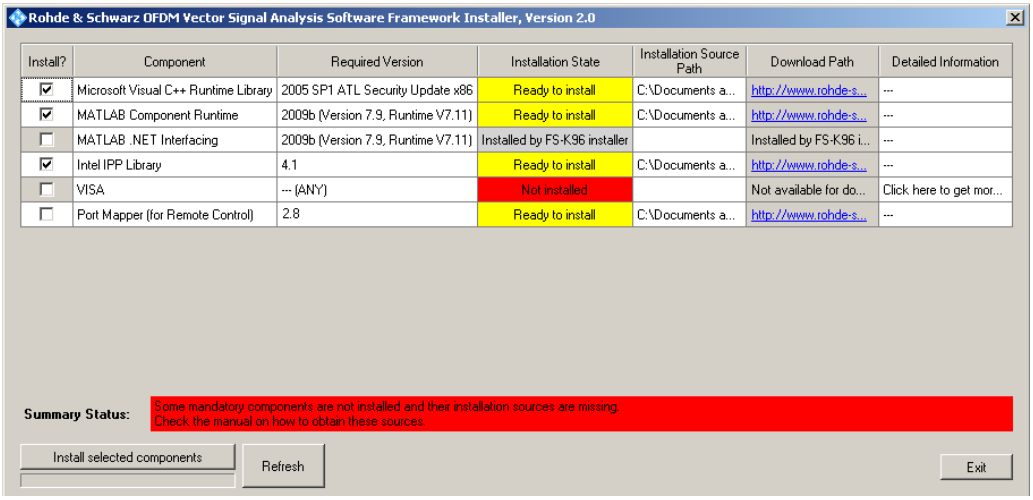
Required Components
The R&S FS-K96 OFDM Vector Signal Analysis Software needs some additional software components to run properly. Follow the steps below:
Installing Microsoft .NET Framework Version 2.0
Start Check for .NET Installed (exe).
A message box tells you if the .NET Framework is installed or not.
If .NET is not installed, start the .NET Framework Installer (exe) and follow the instructions.
Installing required components:
Start the installation of all required components by using the R&S Framework Installer (exe).
A dialog box lists all required components. Check the "Installation State" of the components you want to install.
If the component is "Ready to install", it can be installed by just selecting the component with the checkbox in the first column and clicking "Install selected components" afterwards.
If the component is "Ready to download", the Framework Installer cannot find the installation file on a local hard drive. You need to download the component and install it manually.
Install the missing components with the "Install selected components" button.

10. The installer opens the following dialog box:


Rohde & Schwarz OFDM Vector Signal Analysis Software Framework Installer, Version 2.0
Install? | Component | Required Version | Installation State | Installation Source Path | Download Path | Detailed Information
Microsoft Visual C++ Runtime Library | 2005 SP1 ATL Security Update x86 | Ready to install | C:\Documents a... | http://www.rohde-s... | ---
MATLAB Component Runtime | 2009b (Version 7.9, Runtime V7.11) | Ready to install | C:\Documents a... | http://www.rohde-s... | ---
MATLAB .NET Interfacing | 2009b (Version 7.9, Runtime V7.11) | Installed by FS-K96 installer | | Installed by FS-K96 i... | ---
Intel IPP Library | 4.1 | Ready to install | C:\Documents a... | http://www.rohde-s... | ---
VISA | --- (ANY) | Not installed | | Not available for do... | Click here to get mor...
Port Mapper (for Remote Control) | 2.8 | Ready to install | C:\Documents a... | http://www.rohde-s... | ---
Summary Status:
Some mandatory components are not installed and their installation sources are missing.
Check the manual on how to obtain these sources.
Install selected components
Refresh
Exit

Mandatory Components
- Microsoft Visual C++ Runtime Library
- MATLAB Component Runtime
- MATLAB .NET Interfacing
- Intel IPP Library
- VISA

Optional Components
- Port Mapper
  (necessary for remote control of the R&S FS-K96 Software)

11. The mandatory components need to be installed in order to operate the software. Check the “Installation State” of the components you want to install.
    a) If the component is “Ready to install”, it can be installed by just selecting the component with the checkbox in the first column and clicking “Install selected components” afterwards.
    b) If the component is “Ready to download”, the R&S Framework Installer cannot find the installation file on a local hard drive. You need to download the component and install it manually. Afterwards, you can use the R&S Framework Installer to check, whether the installation has been successful.
    c) If you do not have the VISA component already installed on your PC, it is recommended to install the component from the additional CD that is supplied together with the R&S FS-K96 Software package.
12. Start the installation by pressing the "Install selected components" button. All selected components will be installed.

Note that the Matlab .NET Interfacing is installed with the Matlab Component Runtime. There is no separate installation routine for it.

You can also install all components manually. All files necessary are on the CD-ROM in the corresponding directories in the `\install\Framework` folder.

Install VISA

It is necessary to install VISA (Virtual Instrument Software Architecture) to access instruments connected to the PC via IEEE or LAN bus.

Please use the National Instruments VISA:

- The National Instrument VISA driver CD is supplied together with the R&S FSPC Software package. You can also visit http://www.ni.com/visa to get the latest version for your operating system.

1.2.2 Installing the R&S FS-K96 Software

After installing all required components, you can install the R&S FS-K96 Software.

You can start the installer either by using your browser to navigate there or directly from the CD (`\install\OFDM Vector Signal Analysis Software.exe`).

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Installing R&S FS-K96 OFDM Vector Signal Analysis Software
After having installed all required components, you can install the R&S FS-K96 (exe).

The installer will do the following:

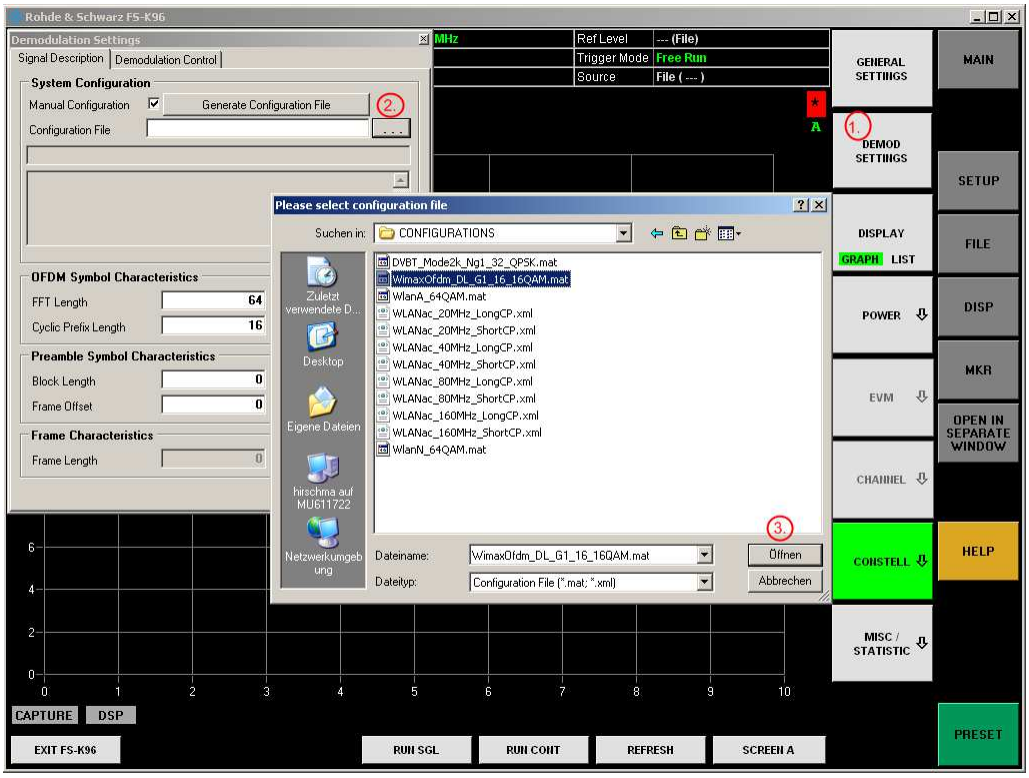
- Install the R&S FS-K96 Software including an uninstall tool
- Create a Windows Start Menu entry (Programs → R&S OFDM Vector Analysis Software)
- Create a shortcut on the desktop (optional)

Start the software via the start menu entry or the shortcut on the desktop.

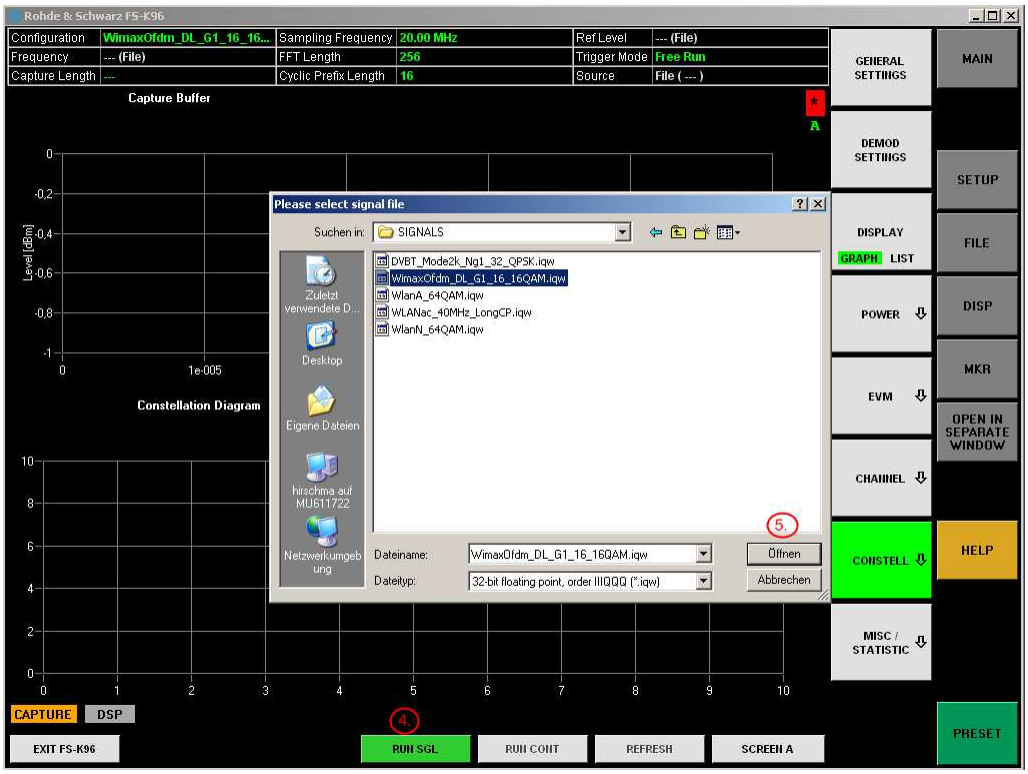
1.2.3 Checking for Successful Installation

After a successful installation, please start the R&S FS-K96 Software. Run the following sequence in order to check the functionality:

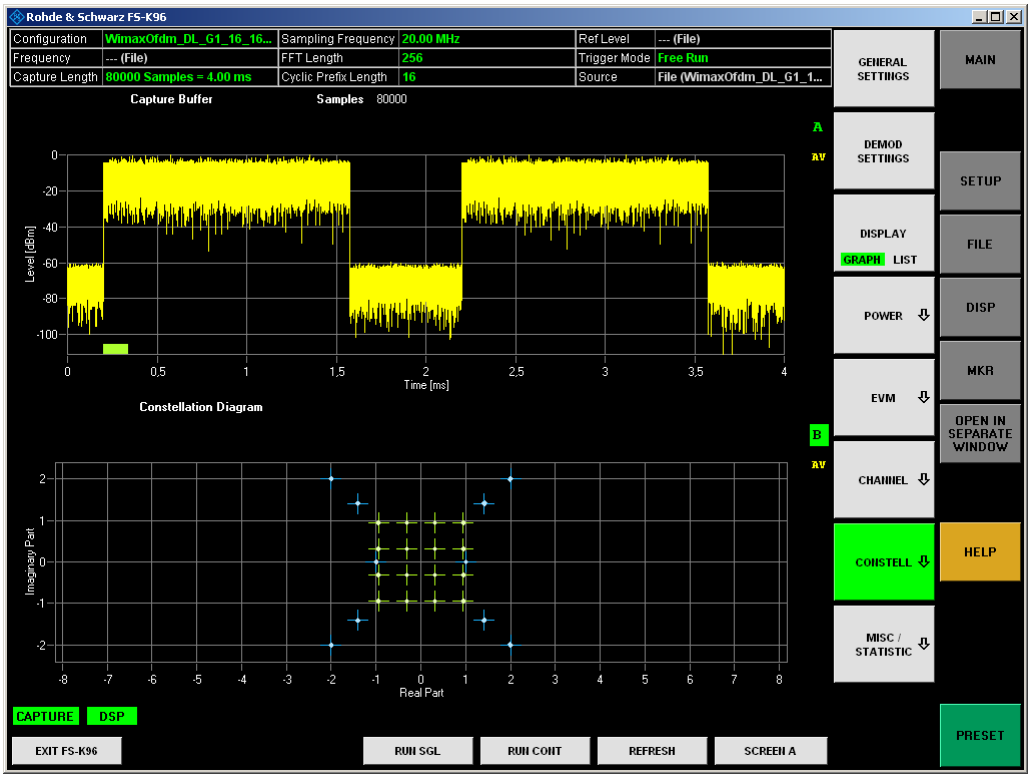
- ► If you do not have the license smartcard (cf. Using the Smartcard Reader) at hand, click “Demo Mode” in the dialog that prompts you to insert your smartcard.
- ► The R&S FS-K96 Software opens. Click on the hardkey <*DEMOD SETTINGS*> on the right hand side and select the file `WimaxOfdm_DL_G1_16_16QAM.mat` as Configuration File. You can find this file in your install directory in the folder `\CONFIGURATIONS`.



- ► Press the hotkey <*RUN SGL*> and select the file `WimaxOfdm_DL_G1_16_16QAM.iqw`. You can find this file in your install directory in the folder `\SIGNALS`.



► You should get a valid measurement as shown in the following screenshot.



1.2.4 Uninstalling the R&S FS-K96 Software

The OFDM Vector Signal Analysis Software can be uninstalled using the Uninstall tool in "`%Program folder%\Rohde-Schwarz\OFDM Vector Signal Analysis Software\Uninstall`" or via "Add or Remove Software" in the Windows Control Panel.

The framework components have to be uninstalled manually via "Add or Remove Software" in the Windows Control Panel.

Before uninstalling the components, ensure that no other software uses one of the components.

The following programs have been installed:

- Intel Integrated Performance Primitives RTI4.1 for Windows on Intel Pentium processors
- Matlab Component Runtime 7.11
- Rohde & Schwarz OFDM Vector Analysis Software (FS-K96)
- Microsoft .NET Framework 2.0 (see following note)
- Microsoft Visual C++ 2005 Redistributable (see following note)
- Rohde & Schwarz Portmap 2.8.3 (optional)

It is not recommended to uninstall the two Microsoft components:
- Microsoft .NET Framework 2.0
- Microsoft Visual C++ 2005 Redistributable
- They are most probably also used by other software components on your PC.

1.3 Using the Smartcard Reader

To enable the FS-K96 software via smartcard (dongle), you have to load the FS-K96PC or FS-K96 license on an existing smartcard or order a new smartcard (FSPC license dongle PC software).

You can use the smartcard together with the USB smartcard reader (for SIM format) supplied with the software or insert the smartcard (full format) in a reader already connected to your PC or built in your PC. Instructions on how to insert the card into the reader is also supplied together with the CD package.

Note that support for problems with the smartcard licensing can only be guaranteed, if the supplied USB smartcard reader (for SIM format) is used.

13. With the delivery of the R&S FSPC you got a smartcard and a USB smartcard reader.

14. Remove the smartcard.

15. Insert the smartcard into the USB smartcard reader.
    With the USB smartcard reader such that the LED or "OMNIKEY" label is facing upward, insert the smartcard with the chip facing downward and the angled corner facing away from the USB smartcard reader.

16. After pushing the smartcard completely inside the USB smartcard reader, you can use it together with the software.

If you insert the USB smartcard reader into the PC, the drivers will be loaded. If your PC does not already have drivers installed for this reader, the hardware will not be detected and the R&S FS-K96 Software will not work.

In this case, please install the required driver manually. You will find it in the folder `\install\USB SmartCard Reader Driver Files`, named according to the processor architecture (OMNIKEY3x21_x86... or OMNIKEY3x21_x64). Detailed information on the file content and the download location for updated drivers can be found in the `ReadMe.txt` file in the same folder.

You may have problems locking your PC while the card is inserted, as Windows will try to get log-in information from the card immediate after you lock your PC.
You can overcome this problem by editing one registry entry. Either execute the registry file `DisableCAD.reg` in the same folder the USB Smartcard reader installation files are located. Or manually change the entry:

- ► Open the Windows Start Menu and select the "Run" item.
- ► Enter "regedit" in the dialog to open the system registry.
- ► Navigate to `HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion\policies\system`.
- ► Set the value of DisableCAD to 0.

Note that security policies may prevent you from editing the value. Contact your IT administration if you have problems with editing the value or installing the drivers.

2 New Functions

This section lists the new functions that were introduced in version 3.5 and the previous versions.

2.1 Support for the 160 MHz Analysis Bandwidth option FSV-B160

The R&S®FS-K96 Software can now capture and analyze signals up to the I/Q bandwidth of 160 MHz for the FSV Signal and Spectrum Analyzer. This feature requires the option FSV-B160.

2.2 Support for the 320 MHz Analysis Bandwidth option FSW-B320

The R&S®FS-K96 Software can now capture and analyze signals up to the I/Q bandwidth of 320 MHz for the FSW Signal and Spectrum Analyzer. This feature requires the option FSW-B320.

2.3 Lists of New Functions

2.3.1 Current Release V3.5

Version	Function
V3.5	Support for the 160 MHz Analysis Bandwidth option FSV-B160

Version	Function
V3.5	Support for the 320 MHz Analysis Bandwidth option FSW-B320
V3.5	Support for the Analog Baseband Inputs option FSW-B71
V3.5	New demodulation control parameter "cyclic delay" for signals with cyclic shifted FFT parts
V3.5	New modulation error rate result parameter "MER All"

2.3.2 Earlier Releases V3.0 to V3.4

Version	Function
V3.4	Support of the R&S®RTO Oscilloscope
V3.4	Import and export of I/Q data using the iq-tar file format
V3.4	Additional normalization modes for EVM calculation
V3.4	External trigger port selection for the R&S®FSW signal analyzer
V3.3	160 MHz signal bandwidth using the R&S FSW-B160 bandwidth extension
V3.3	Selectable normalization and frame averaging modes for EVM calculation
V3.3	Full demodulation and reference data readout by remote control
V3.3	Marker on peak and minimum traces available
V3.2	Support for the R&S®FSW Signal Analyzer
V3.2	Support for signals with two different cyclic prefix lengths
V3.2	Support for WLAN 802.11ac signals
V3.2	Tutorial videos
V3.2	Generation of example I/Q signals with the FS-K96 Configuration File Wizard
V3.2	New remote control commands
V3.2	Drag & Drop functionality for I/Q data files, configurations files and setting files
V3.1	R&S FS-K96 Configuration File Wizard
V3.1	Demonstration mode that operates without a license
V3.1	Support for the R&S FSVR Real-Time Spectrum Analyzer
V3.1	Support for Windows 7 32-bit and 64-bit
V3.0	Software is licensed with a smartcard / dongle.
V3.0	Support for FSQ, FSG, FSUP, FSV (please refer to the manual for details on the minimum firmware requirement)

Version	Function
V3.4	Support of the R&S®RTO Oscilloscope
V3.4	Import and export of I/Q data using the iq-tar file format
V3.4	Additional normalization modes for EVM calculation
V3.4	External trigger port selection for the R&S®FSW signal analyzer
V3.0	Matlab Kernel is upgraded to Matlab 2009b.
V3.0	Support for Windows 7 32-bit
V3.0	Possibility to evaluate more than two measurements simultaneously ("OPEN IN SEPARATE WINDOWS" hardkey)
V3.0	Coupled markers for Screen A and Screen B
V3.0	Read-in of an encrypted *.wv file (compatible to R&S WinIQSIM)
V3.0	New measurement results: ● Allocation Matrix of the configuration file (for debugging). ● EVM vs. Symbol for one specific carrier ● Power vs. Symbol for one specific carrier ● EVM vs. Carrier for one specific symbol ● Power vs. Carrier for one specific symbol

3 Modified Functions

The following table lists the modified functions and indicates the version in which the modification was carried out:

Version	Function
V3.5	The default file input format is now the iq-tar file format (instead of the iqw file format).
V3.3	The Save Demod Data key now stores both the received data and the reference data within one MAT-file.
V3.3	The power spectrum result is always available if a valid capture buffer exists, regardless of the demodulation state.
V3.3	The remote control readout of the impulse response trace distinguishes between linear and logarithmic unit, which can be selected in the measurement settings.

4 Improvements

The following table lists the improvements and indicates the version in which the issue was observed for the first time:

Version	Function
V3.4	Improved the frame synchronization for continuous signals with large data constellations, e.g. DOCSIS signals
V3.4	Improved the channel estimation for signals with highly irregular pilot distribution, e.g. truncated DOCSIS frames
V3.4	Solved installer conflicts with 3rd party VISA software

Improvements from previous versions:

Version	Function
V3.3	The R&S FS-K96 did not accept the R&S FSVR as capture source. This issue is solved. The R&S FS-K96PC was not affected.
V3.2	TRACe[:DATA]? remote control output for EVM vs Carrier and EVM vs Symbol traces were scaled different from the displayed traces. This issue is solved.
V3.2	Auto levelling for wide bandwidth signals with high power on the R&S FSW Signal Analyzer has been improved.
V3.1	Optimization for OFDM signals with high spectral efficiency (few guard carriers) – relevant mainly for FSQs with the B72 option
V1.0	Increased accuracy of the channel estimation. In rare conditions, not all pilot cells were considered for channel estimation.
V1.0	Constellation diagram “pumping” during continuous measurement
V1.0	Out of memory for large constellations (>256 QAM)
V1.0	No frequency error calculation for special configurations
V1.0	EVM vs. Symbol mean trace missing for symbols with Don't Care Cells
V1.0	IF filter bandwidth setting too high if adjustable channel filter is used

5 Modifications to the Documentation

The new and modified functions mentioned in these release notes are already documented. The manual can be downloaded from the internet under:

http://www.rohde-schwarz.com/product/FSK96.html.

6 Customer Support

Technical support – where and when you need it

For quick, expert help with any Rohde & Schwarz equipment, contact one of our Customer Support Centers. A team of highly qualified engineers provides telephone support and will work with you to find a solution to your query on any aspect of the operation, programming or applications of Rohde & Schwarz equipment.

Up-to-date information and upgrades

To keep your instrument up-to-date and to be informed about new application notes related to your instrument, please send an e-mail to the Customer Support Center stating your instrument and your wish. We will take care that you will get the right information.

Europe, Africa, Middle East
Phone +49 89 4129 12345
customersupport@rohde-schwarz.com

North America
Phone 1-888-TEST-RSA (1-888-837-8772)
customer.support@rsa.rohde-schwarz.com

Latin America
Phone +1-410-910-7988
customersupport.la@rohde-schwarz.com

Asia/Pacific
Phone +65 65 13 04 88
customersupport.asia@rohde-schwarz.com

China
Phone +86-800-810-8828 / +86-400-650-5896
customersupport.china@rohde-schwarz.com